return to its anatomical position and facilitating the passage of a supplemental injection.

There is evidence that an adequate block can be achieved with a single peribulbar injection placed either inferotemporally[4,6] or medially.[7] There is no evidence that a second primary injection decreases the rate of supplemental injections required. We therefore propose that a second primary peribulbar injection is unnecessary and may carry an increased risk of globe perforation.

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Sir,

Optic disc morphology on presentation of chronic glaucoma

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Different patterns of optic disc damage have been described in chronic glaucoma.[1–3] It has been suggested that these morphological appearances may represent different clinical entities with specific pathogenic mechanisms.[1–4] The aims of this study were firstly, to determine the prevalence of various patterns of disc damage in new patients with the diagnosis of primary open-angle glaucoma; and secondly, to compare the mean age, gender distribution and mean intraocular pressure between groups to determine whether the disc patterns may represent different populations of patients with glaucoma.

Participants, methods and results

Between July 1994 and August 1999, 1696 new patients were seen in a glaucoma screening clinic and a diagnosis of chronic open-angle glaucoma was made in 250. Twenty-nine patients who presented with bilateral advanced atrophy of the optic disc and extensive visual field loss were not included in the study. Each patient underwent a comprehensive ophthalmic examination by a glaucoma specialist and Humphrey visual field analysis.

The optic discs were classified by the same observer (JFS) using direct and indirect ophthalmoscopy into six categories:

(1) Inferior neuro-retinal rim loss: a disc with tissue loss localised to the inferior/infero-temporal pole, including shelving, or generalised loss of the inferior rim, but not focal notching.
(2) Superior neuro-retinal rim loss: a disc with tissue

loss localised at the superior/supero-temporal pole, including shelving and generalised loss of the rim, but not focal notching.

(3) Concentric cupping: a disc with generalised enlargement of the optic cup without a localised defect in the neuro-retinal rim.
(4) Age-related atrophic (senile sclerotic): a disc with a saucerized, shallow cup and parapapillary atrophy.
(5) Myopic glaucomatous disc: a myopic disc with a temporal crescent and additional evidence of glaucomatous damage.
(6) Focal ischaemic: a disc with a focal notch.

For the purposes of this study, the eye with more advanced optic disc damage was analysed. In each case the predominant visual field defect correlated with the neuro-retinal rim defect. An ANOVA was used to determine whether a statistically significant difference existed between the disc appearance and patient variables. A P-value of < 0.05 was considered statistically significant.

Of the 221 patients with primary open-angle glaucoma, 53.4% had inferior neuro-retinal rim loss, 8.6% had superior neuro-retinal rim loss, 18.1% had concentric cupping, 9.5% had age-related atrophy, 5.4% had myopic glaucoma and 5% had focal ischaemia. The relationship between age in years and the different disc categories is shown in Figure 1. The average intraocular pressure for the different disc categories is shown in Figure 2. There were no statistically significant differences between the groups in respect of age, gender or intraocular pressure.

Comment

In patients with established glaucoma it can be difficult to classify the optic discs accurately into different morphological patterns, because most discs have a mixed appearance.[5] Interestingly, in this study this was not found to be a problem, perhaps because patients were being seen on first presentation with early glaucoma and because six, rather than four, categories were used. Photographs and scanning laser ophthalmoscopy were not used, but all patients were examined by the same, experienced glaucoma specialist. A previous study using scanning laser ophthalmoscopy revealed that the sensitivity of predicting the various optic disc appearances using this modality varied from 93% (focal ischaemic) to 67% (senile sclerotic) and indicates that, at least presently, expert clinical evaluation of the optic disc remains the most important part of the diagnostic examination of glaucoma suspects.[5]

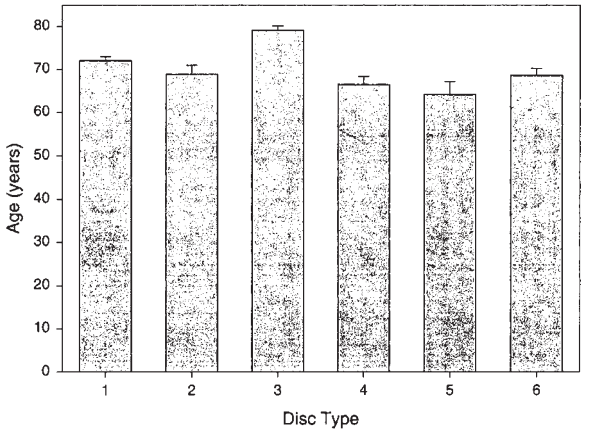

Figure 1 Histogram showing the age (mean ± SEM) distribution of patients in the six disc categories.

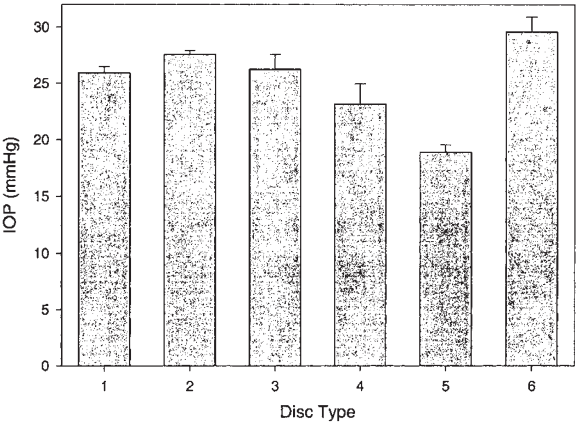

Figure 2 Histogram showing the IOP measurements (mean ± SEM) of patients in the six disc categories: 1 = Inferior neuro-retinal rim loss. 2 = Superior neuro-retinal rim loss. 3 = Concentric cupping. 4 = Age-related atrophic. 5 = Myopic glaucomatous. 6 = Focal ischaemic.

Selective loss of neuro-retinal rim tissue in glaucoma occurs primarily in the infero-temporal region of the optic nerve head and, to a somewhat lesser extent, in the supero-temporal sector in the early stages of damage, which leads to enlargement of the cup in a vertical or oblique direction.[6,7] Our study found that inferior/infero-temporal neuro-retinal rim loss is the most common disc change encountered on presentation of primary open-angle glaucoma (53%) followed by concentric cupping (18%) and that superior/supero-temporal neuro-retinal rim loss and other patterns are relatively uncommon.

Based on analysis of highly selected glaucoma patients with photographically pure features of differing optic disc morphology, previous authors have reported that discs with generalised enlargement of the optic cup are associated with high intraocular pressure measurements, and that those individuals with myopic glaucomatous atrophy and concentric cupping are

more likely to be young, while those with age-related atrophic and focal ischaemic discs are more likely to be elderly.[1–4] Although similar trends were present in our study, statistically significant differences were not found. This would suggest that in clinical practice, the morphological appearance of the optic disc may not provide clues to the pathogenesis of the disc damage.

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Sir,

Malignant glaucoma following needling of a trabeculectomy bleb

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The term malignant glaucoma describes a form of secondary angle closure glaucoma with raised intraocular pressure (IOP), shallow or flat anterior chamber (AC), in the presence of a patent peripheral iridectomy (PI). Although the exact pathophysiology of malignant glaucoma remains an enigma, the postulated mechanism is an abnormal anatomical interaction between the ciliary processes, lens and anterior vitreous face associated with misdirection of the aqueous posteriorly.[1] It is theorized that this anterior displacement of the lens-Iris diaphragm (due to sudden shallowing of anterior chamber or slack lens zonules) results in forward rotation of the ciliary body and apposition of ciliary processes to the lens equator. This leads to misdirection of the aqueous posteriorly. Further evidence is supplied by Epstein *et al*[2] who, based on experimental perfusion studies on enucleated eyes, proposed that a thickened anterior hyaloid face and impedance to aqueous flow across the intact anterior hyaloid leads to sequestration of aqueous within the posterior segment. This results in a forward displacement of the vitreous into apposition with lens and ciliary body, directing the aqueous posteriorly.

Case report

A 70-year-old, emmetropic, Chinese male underwent right trabeculectomy with intra-operative 5-fluorouracil application for primary open angle glaucoma. His angles were open (grade 3 Shaffer) in both eyes, axial length of 22.72 mm in the right eye (RE) and 23.56 mm in the left and AC depth of 2.7 mm in the RE. Preoperatively he was treated with latanoprost, timolol and pilocarpine 2% eye drops. At the first three postoperative visits, the flat bleb was raised with ocular massage and IOP hovered around 9–13 mmHg following the massage. At one month post-op, the IOP had increased to 28 mmHg and the bleb remained shallow despite ocular massage. Argon laser suturelysis was attempted but failed. Thus needling was performed to raise the flap and one of the flap sutures was cut. Immediately post-needling minimal shallowing of the AC was noted but there was no irido-corneal touch. Intraocular pressure dropped to 5 mmHg. Topical prednisolone and tobramycin eye drops were continued but he returned 5 days later with a sudden drop in visual acuity and a red, painful eye. On slit-lamp examination, there was complete irido-corneal touch with early corneal decompensation, a negative Siedel's test, flat bleb, patent PI, posterior synechiae and mild fibrinous AC reaction. His IOP was 21 mmHg and B-scan ultrasonography did not demonstrate fluid loculation within the vitreous cavity. Ultrasound biomicroscopy (UBM) (Figure 1) showed a flat bleb and total irido-corneal touch with only a very shallow 'slit' anterior chamber centrally. It also